

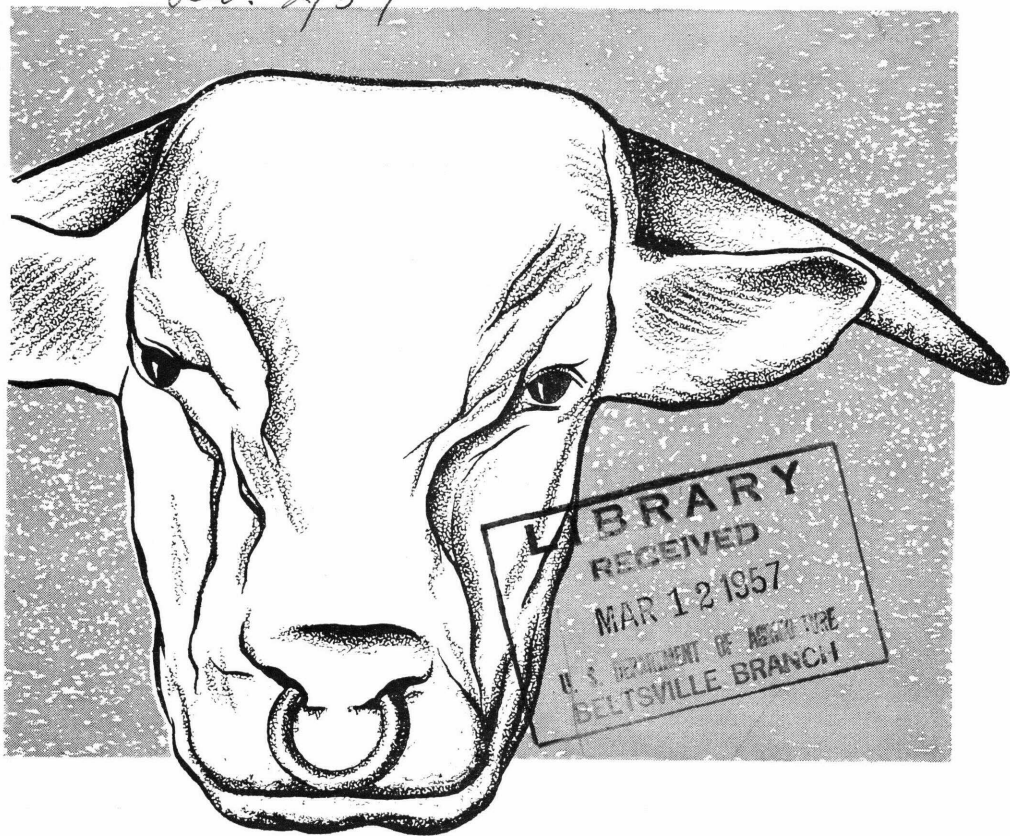
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# **BEEF CATTLE**

## **for Breeding Purposes**

**Farmers' Bulletin No. 1916**

**U. S. DEPARTMENT OF AGRICULTURE**

The production of breeding stock is a specialized phase of the beef-cattle enterprise. It requires a thorough knowledge of breeding, feeding, and management.

Selection of individual animals within a breed is of more importance than selecting the breed itself. Also, it is essential that the animals be given the necessary feeding, care, and management to insure their proper development.

To insure normal development, young growing stock should be fed nutritionally adequate rations that include an abundance of good quality forages.

The suggestions in this bulletin are offered as a guide in selecting, breeding, feeding, and managing beef calves, yearlings, and mature stock under general farming conditions.

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# BEEF CATTLE

## for Breeding Purposes

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Beef-cattle breeders fall into three more or less general groups: (1) Those engaged in commercial production of beef cattle who depend on breeders of registered cattle for their herd-sire replacements; (2) those engaged in commercial production who maintain herds of registered cattle to produce their own herd-sire replacements; and (3) those who devote their entire facilities to producing registered stock for sale to commercial producers and to other registered breeders.

Breeders in all these groups must have a high technical knowledge of cattle-breeding problems and also experience in the care, feeding, and management of cattle. Breeders of registered cattle have accurately recorded genealogical information in the form of individual pedigrees. They are in a position, therefore, to make great contributions to breed improvement through the use of modern genetic principles. They are the "stud" breeders, and they are charged with a tremendous responsibility to the entire beef-cattle industry.

The breeder who devotes his entire facilities to producing registered stock will need no more capital to obtain and maintain acceptable breeding stock than he would need to obtain and maintain any well-established registered herd on a commercial ranch, unless he has as his goal the maintenance of a show herd with full participation in the show circuit. Livestock shows provide keen competition for breeding stock and an excellent means of advertising, but the expense is often beyond the means of many small breeders.

A breeder of registered beef cattle, in either a general farming or a range environment, should make maximum use of pasture or range grasses for greatest economy. Therefore, he should gear his operation to a grassland type of economy in which pasture-improvement or range-improvement practices go hand in hand with breed improvement. Furthermore, as breeders of registered beef cattle control the source and supply of genetic material for breed improvement, they should recognize and be the first to use new breeding techniques that point the way toward greater efficiency and economy in beef production.

### SELECTION OF A BREED

In establishing a breeding herd of beef cattle, the selection of a breed is largely a matter of personal preference. Selection of the individual animals within the breed is more important than selecting the breed itself. Each breed has distinguishing characteristics not only in color markings, conformation, and type, but also in adaptation to specific environments. No single breed is best adapted to all localities. One may have some advantages over others for certain areas.

The predominant breeds of registered beef cattle in the United States are the Aberdeen Angus, Brahman, Hereford, and Shorthorn.



The Hereford and Shorthorn breeds include both horned and polled types. Aberdeen Angus are polled. Although a few polled Brahms are found, they are typically horned.

Several new breeds, such as Beefmaster, Brangus, Charbray, and Santa Gertrudis, have been developed from crossbred matings between Brahms and the European-type cattle. These new breeds are making significant progress in the Gulf Coast States and in other regions.

The characteristics of each breed are discussed in Farmers' Bulletin 1779, "Beef-Cattle Breeds for Beef and for Beef and Milk." Copies are available on request from the Office of Information, U. S. Department of Agriculture, Washington 25, D. C.

Anyone contemplating the purchase of a foundation herd and the production of beef cattle for breeding purposes will find it highly advisable to consult competent unbiased persons in regard to the relative merits, current prices, and desirable blood lines of the respective breeds. An excellent way in which to obtain such knowledge is to visit beef-cattle breeding establishments or commercial cattle operations where the different breeds or families within breeds are on test for production.

Representatives of the State agricultural colleges may be consulted to advantage regarding the selection of breeding cattle and other pertinent problems that may arise. Also, the various breed associations employ field representatives who lend assistance to breeders in the purchase, sale, and management of cattle.

## **ESTABLISHMENT OF A BREEDING HERD**

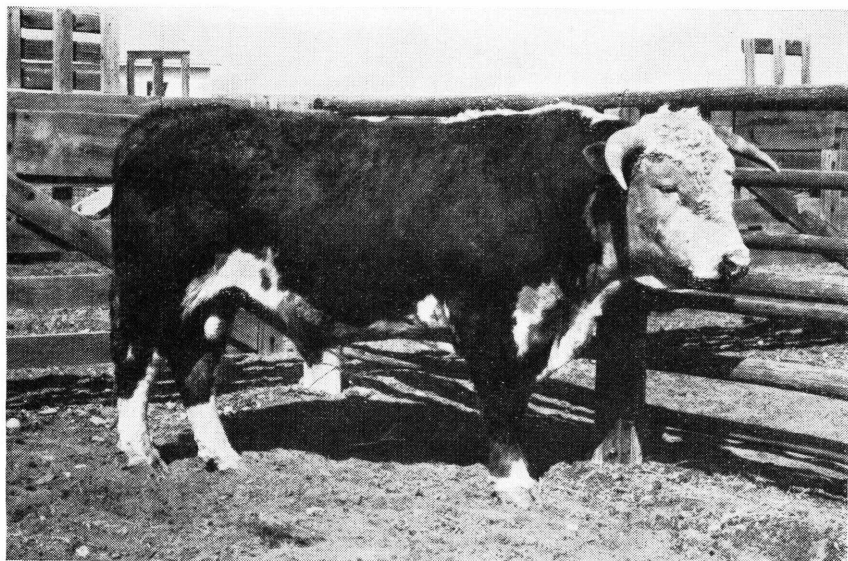
### **Selecting the Herd Bull**

In establishing a herd of registered cattle, the selection of a suitable bull to head the herd is a major consideration. One important point to consider in selecting the bull is his record of performance. In aged bulls, a good record of performance refers to the production of superior offspring. In yearlings or other young bulls, a good record of performance refers to a high weight-for-age and a high rate of gain during the months from weaning to breeding age.

Experiments at Federal and State experiment stations show that weight-for-age at weaning is indicative of the milking capacity of the dam and the growth potential of the calf. Gain in weight from weaning to 12 or 15 months of age under optimum conditions of growth is indicative of the inherent growth potential of the calf. The experiments show that rate of gain from weaning to 12 or 15 months of age is highly heritable, and when high-gaining bull calves are later used as herd sires they will in turn produce high-gaining calves.

The value of record-of-performance information as a criterion in the selection of a herd sire is illustrated by the individual feeding tests and subsequent progeny tests for the 3 Hereford bulls shown in figures 1, 2, and 3.

The three bulls were born in April 1950 on the range at the U. S. Range Livestock Experiment Station, Miles City, Mont. They were raised on the range without the benefit of either nurse cows or creep-feeding. They were weaned in late October, at 6 months of age.



BN-2583

FIGURE 1.—Hereford bull 339 at 3 years of age, weighs 1,734 pounds. This is a good type Hereford bull in satisfactory breeding condition. He showed good gaining ability in his own performance test, and he has a proved record as a sire of high-gaining calves. U. S. Range Livestock Experiment Station, Miles City, Mont.

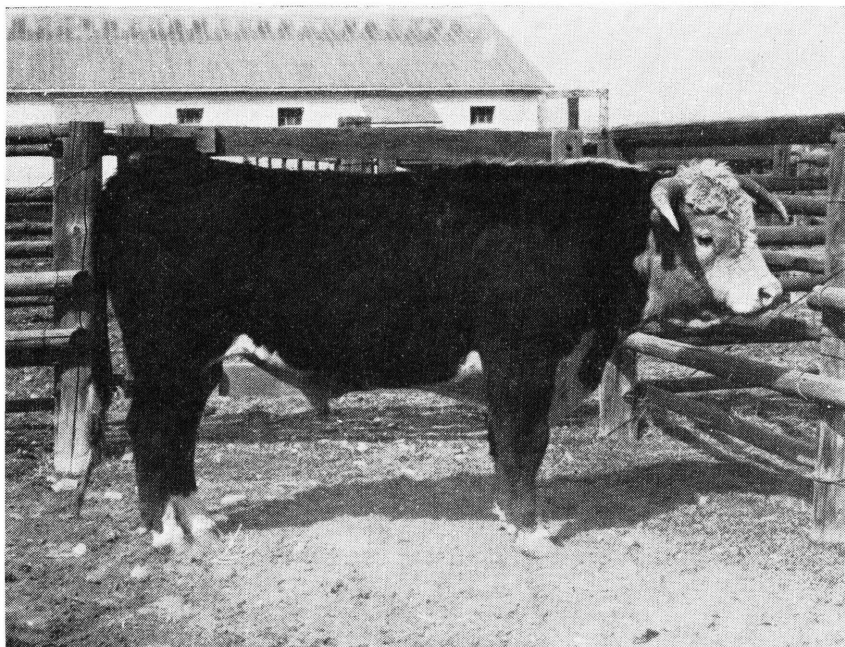
They were full-fed (individually) on a standard grain-roughage ration for a 196-day period ending May 15, 1951. At the end of the feeding period, they were turned onto crested wheatgrass pastures and were fed a limited amount of grain in addition to the pasturage.

On June 15, each was assigned to 31 or 32 mature breeding cows, selected at random, for a 60-day breeding season. The resulting calves were weaned in late October 1952. Eight steers selected at random from each of the three herd-sire groups were full-fed (by sire groups) for a 252-day period beginning November 5.

Bull 339 (fig. 1) weighed 75 pounds at birth and 452 pounds at weaning, gained 2.64 pounds a day in a 196-day performance test, weighed 996 pounds at the close of the test, and weighed 1,734 pounds at 3 years of age. His steer progeny weighed an average of 78 pounds at birth and 441 pounds at weaning, gained an average of 2.48 pounds per day in a 252-day performance test, and weighed an average of 1,064 pounds on July 15, 1953, at approximately 14.6 months of age. Carcass yield, 59.2 percent (based on Miles City weight and cold carcass weight); carcass grade, middle Choice.

Bull 373 (fig. 2) weighed 68 pounds at birth and 457 pounds at weaning, gained 2.42 pounds per day in a 196-day performance test, weighed 949 pounds at the close of the test, and weighed 1,586 pounds at 3 years of age. His steer calves weighed an average of 75 pounds at birth and 436 pounds at weaning, gained an average of 2.36 pounds per day in a 252-day performance test, and weighed an average of 1,035.5 pounds on July 15, 1953, at approximately 14.8 months of age. Carcass yield, 60.1 percent; carcass grade, middle Choice.





BN-2584

FIGURE 2.—Hereford bull 373 at 3 years of age, weighs 1,586 pounds. This bull gained less in his performance test than bull 339, and his steer calves gained less than those sired by bull 339. U. S. Range Livestock Experiment Station, Miles City, Mont.

Bull 374 (fig. 3) weighed 68 pounds at birth and 385 pounds at weaning, gained 1.97 pounds per day in a 196-day performance test, weighed 803 pounds at the close of the test, and weighed 1,396 pounds at 3 years of age. His steer calves weighed an average of 77 pounds at birth and 441 pounds at weaning, gained an average of 2.12 pounds per day in a 252-day performance test, and weighed an average of 990 pounds on July 15, 1953, at approximately 14.8 months of age. Carcass yield, 58.4 percent; carcass grade, middle Choice.

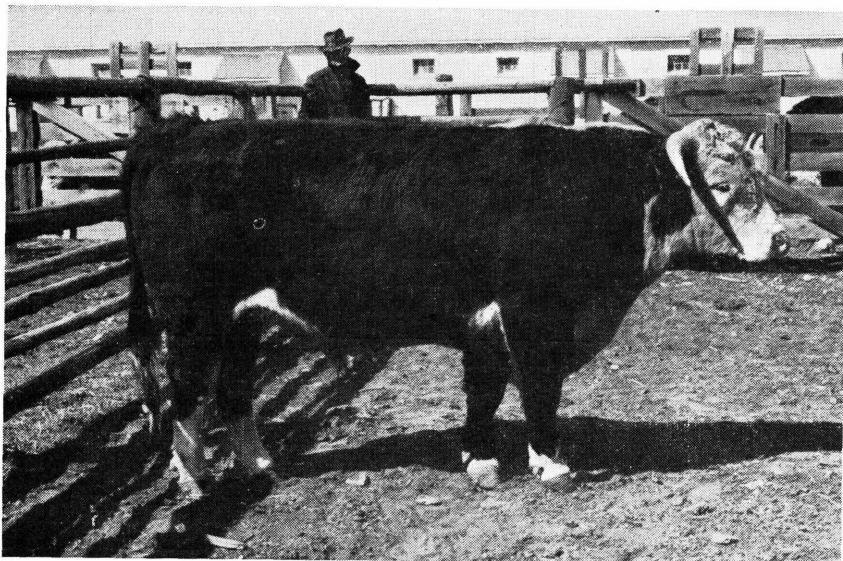
Bull 339 was a high-gaining individual with excellent weight-for-age. As was expected on the basis of his own performance test, he sired high-gaining calves.

Bull 373 gained less than bull 339 in his own performance test, and his steer calves gained less than the calves sired by bull 339.

Bull 374 would rank high with a sale or show-sifting committee from a type standpoint. However, he made a low gain in his own performance test, he lacked weight-for-age as a 3-year-old, and he produced low-gaining calves.

The ultimate value of these bulls as herd sires, which was indicated by their own record-of-performance tests, was proved by the subsequent tests of their progeny.

In addition to record-of-performance tests, other important points to consider in selecting a bull to head the herd include the delivered cost of the bull, a health and fertility guarantee, a pedigree showing



BN-2585

FIGURE 3.—Hereford bull 374 at 3 years of age, weighs 1,396 pounds. This bull might do well in competition if fitted for show; however, in his performance test, he showed poor gaining ability, and he produced low-gaining calves. U. S. Range Livestock Experiment Station, Miles City, Mont.

the desired line of breeding, and the proper type or conformation. In conformation, the bull should be deep-bodied, wide, smooth, and thick-fleshed with sound feet and legs, and he should show the characteristics that are typical of the breed.

In addition to obtaining records on the bull, the prospective buyer should obtain all available information regarding the bull's sire, dam, and other close relatives, including breeding performance, size, type, thickness of fleshing, soundness of feet and legs, and (for cows) milking ability. This information is particularly important when records of performance for the bull are not available or when choosing between two bulls with similar records of performance.

### **Selection of Females**

In choosing foundation females, the prospective breeder should look for animals that reach high mature weights at an early age. Thus, they will complement the fast growth rates transmitted through selected sires. Cows as well as sires should be selected from strains that show adequate milk-producing ability and excellent beef conformation. Cows with these qualifications are difficult to obtain, and the buyer of foundation breeding stock will often have to accept the best individuals available for the money he has to invest.

Breeders who have made miscellaneous purchases should conduct a rigorous culling program in the early stages of herd development in order to establish desirable uniformity in type and efficiency of production. To be efficient from a calf-production standpoint, mature cows should be able to produce calves that weigh from 400 to 450



pounds or more at 6 months of age without the benefit of nurse cows or creep-feeding. As a general rule, breeding females, whether small, medium, or large in type, should be deep-bodied with bold spring of ribs; wide chests and loins; strong backs; long, level rumps; well-muscled thighs; and strong, straight legs.

### Pedigrees

Opinions differ regarding the emphasis that should be given to pedigrees. As a general rule, greater emphasis should be placed on an animal's performance and individuality than on its pedigree. However, the pedigree is of value in portraying the immediate ancestry of the animal, the herds from which these ancestors came, and the degree of line breeding or inbreeding.

There are two general types of pedigree forms. In the extended form (below), which is now in general use by most breeders, the sires are listed on the top half of each bracket and the dams on the lower half. In the abbreviated form (p. 7), which was used until recently by Shorthorn breeders, the dams are listed on the left, and the bull's sire and the sires of the dams are on the right. Below these names are the three top sires on the right with two generations of their pedigrees.

In judging a pedigree, special consideration should be given to the first three generations. The real value of a pedigree is measured by the number of close ancestors that have proved to be outstanding breeding animals.

GENERAL OF PAGE 452594

Calved: April 22, 1931

Bred and owned by -----  
(Name and address)

Revolution of Page 11th 407252	{	Blackcap Revolution 287269	{	Earl Marshall 183780
			{	Blackcap McHenry 104th 149400
	{	Eline E. 4th of Page 260346	{	Ensign of Glencarnock 217216
			{	Eline E. 2d 155531
Genevette of Ballin- dalloch 428990	{	Jorum of Ballindalloch 423476	{	Evilescio of Ballindalloch 423406
			{	Bella of Ardargie 311851
	{	Geneva of Ballindalloch 428954	{	Evolensign of Ballindalloch 428940
			{	Gisela 428953

## SULTAN PRINCE 2D 1914193

Roan, calved July 10, 1937. Bred and owned by -----  
(Name and address)

<i>Dams</i>	<i>Breeders of dams got by—</i>	<i>Sires</i>	<i>Breeders of sires</i>
Edellyn Rosewood 9th 1580535	Thos. E. Wilson	Sultan Browndale 1771330	Thos. E. Wilson
Winmoor Rosewood 4th	W. H. Schendorf	Browndale Count 1156438	James Douglas
Ravendale Rosewood	John O. Pew & Son	Linwood Rodney 1020043	Carpenter & Ross
Rosewood 93d	Carpenter & Ross	Glaryford Augustus 716421	M. Dysart
Maxwalton Rosewood 6th	Carpenter & Ross	Revolution 388359	Carpenter & Ross
Rosewood 92d	W. D. Morrison	Maxwalton Renown 367543	Carpenter & Ross
Rosewood 76th	J. Bruce	Golden Prince 306267	R. Copland
Rosewood 54th	J. Bruce	Waverley 136405	A. Strachan
Rosewood 23d	J. Bruce	Cap-a-Pie 106717	J. Bruce
Rosewood 13th	J. Bruce	Duke of Edinburgh 130843	J. Bruce
		Privy Seal 109647	A. Cruickshank

Sultan Browndale, sire, Glenburn Field Marshal 1709714 by Edellyn Favorite 1430250, out of Clipper Countess 2d 1215702; dam, Rockwood Golden Chain 5th 1712052 by Golden Browndale 1498465, out of Golden Lady 13th 1307124.

Browndale Count, sire, Browndale 334947 by Avondale 245144, out of Maxwalton Mina 2d 86601; dam, Morning Blossom 2d 1023473 by Roan Chief 361556, out of Morning Blossom 711477.

Linwood Rodney, sire, Rodney 753273 by Sanguhar Dreadnought 680399, out of Rosetta 7th 753278; dam, Baroness Undine 794380 by Baron's Pride 306627, out of Nonpareil Undine 794391.

## SELECTING ANIMALS TO BE MAINTAINED IN THE HERD

Breeders should select animals to be maintained in their herds on the basis of both type and performance. Animals selected on the basis of type alone may have excellent body conformation but low calf-producing capabilities and low weight-for-age characteristics. On the other hand, selection based entirely on performance, as expressed by a high weight at weaning for calves and a high weight-for-age factor for heifers, cows, or bulls, could be misleading.

A good index of a cow's performance is the rate of gain of her calves from birth to weaning, whereas the inherent gaining ability of the calves is reflected in their rate of gain from weaning to 12 or 15 months of age on full feed. Both factors should be considered in selecting animals to be maintained in the herd.

In judging performance, the breeder should take into account any specific environmental handicap that he knows a given calf has been subjected to. Under similar conditions, calves produced by 2-year-old and 3-year-old heifers usually are smaller at 6 months of age and at weaning than calves produced by mature cows. The heaviest calves, on the basis of weaning weights, are usually produced by cows from 6 to 8 years of age.

Pedigrees showing lines of breeding, records of the weight of individual animals at specific ages (birth, 6 months, at weaning, at 15 to 24 months, and at maturity), and type scores all provide information useful in the conduct of a breeding program.

Scales for weighing cattle and feed can be purchased and installed at moderate cost. With a little practice, any competent cattleman can obtain and record visual type scores for the animals in his herd.

A simple scoring system, in which a composite type rating may be ascribed for cattle of all ages on a systematic basis by means of descriptive terms, numerical codes, or a percentage evaluation, is shown as follows:

<i>Descriptive term</i>	<i>Numerical code</i>	<i>Percentage evaluation</i>
Excellent-----	1+	100
	1	95
	1—	90
Choice-----	2+	85
	2	80
	2—	75
Good-----	3+	70
	3	65
	3—	60
Medium-----	4+	55
	4	50
	4—	45
Cull-----	5+	40
	5	35
	5—	30

The breeder should establish minimum standards for type and performance for all classes of cattle in his herd, and he should eliminate on a systematic basis individual animals that fail to measure up to the standard. Standards will necessarily differ between farms and from year to year on the same farm, depending on the type of range or pasture on which cattle are raised. Under many circumstances, however, heifers that fail to wean calves that weigh over 350 pounds at 6 months of age and mature cows that fail to wean calves that weigh over 400 pounds at 6 months of age should be culled from the herd. On the basis of type, animals that score medium (4+ or 55) or below usually should be culled from the herd. However, if a mature cow scores "excellent" or "choice" but weans a substandard calf, both the dam and the calf should be culled. On the other hand, cows that lose weight while rearing a large calf but had acceptable type scores as yearling heifers deserve to be retained in the herd as superior animals.

From time to time the livestock breeder will have to dispose of non-breeders, otherwise unsatisfactory breeders, and cows that have outlived their usefulness, in addition to culling young stock. Bull calves not suitable for breeding purposes or those that are to be used as show steers should be castrated as early as possible. Heifers unsuitable for breeding purposes, largely because of type, should be sold for beef. Heifers that conform to the desired type and are from good breeding cows should be retained for replacements (fig. 4).

In selecting heifers to be maintained in the breeding herd, the breeder should give consideration to their capacities to consume feed and to their respective weights at 1 to 1½ years of age. To afford a better chance for selection than would otherwise be possible, it is well to maintain a somewhat larger group up to this age than will ultimately be needed for replacement. Culling in the fall eliminates the expense of maintaining undersirable cattle through the winter. In large herds, however, cattle frequently are disposed of in both fall and spring. It may be advisable to feed grain to animals that are to be marketed in order to put them in desirable market condition.

To avoid closer inbreeding than is generally desirable, it becomes necessary after a few years to replace the herd sire. Frequently





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FIGURE 4.—A group of Hereford heifers retained for breeding purposes. Note the uniformity in type and conformation.

this is a difficult task, particularly when the sire has proved to be very satisfactory. In herds that are of sufficient size to warrant the use of two or more bulls, there is the possibility of replacing the senior herd sire with a younger bull that has been tested on a limited number of young cows.

## MANAGEMENT OF THE BREEDING HERD

### Breeding Practices

Either pasture-breeding methods or hand-breeding methods or both are used in most cattle-breeding establishments.

Where cows are pasture-bred, the bull is permitted to run with the cows. Where this method is used, the herdsman should make daily observations of the herd to keep an accurate record of breeding dates.

Where hand-breeding methods are used, the cows are brought to the bull for service or they are brought to a properly equipped stall for artificial insemination.

Although artificial insemination offers promise, it can be used successfully and with safety only by especially trained persons. Several purebred beef-cattle registry associations restrict the use of artificial insemination. Therefore, the breeder should become acquainted with the regulations of his association if he plans to register his calves.

A detailed discussion of artificial insemination is contained in Circular 567, "Artificial Insemination in Livestock Breeding," issued by the U. S. Department of Agriculture.

Cows are not seasonal breeders but can be bred successfully at all seasons of the year. However, seasonal breeding is practiced in most

areas so that the calves will be born during the season when conditions will be most favorable for their survival and growth.

The time at which cows will permit service is called heat or estrus. The period of estrus usually lasts from 12 to 18 hours. In nonpregnant females, estrus recurs at fairly regular intervals (estrual cycles) ranging from 19 to 23 days and averaging about 21 days. Individual cows deviate considerably from the average in the length of both the estrual cycle and estrus. The frequent occurrence of either extremely short or extremely long estrual cycles often indicates the presence of disease or physiological disturbances, and veterinary assistance may be needed.

When hand-breeding is practiced (either natural service or artificial insemination), the cows must be observed closely for heat at least twice daily. Cows in heat exhibit certain symptoms. Among these are nervousness, walking about a good deal or bawling, and attempting to mount other cows or standing for other cows to mount. At times there is a clear mucus discharge from the vulva. Cows differ considerably in the degree to which they exhibit the symptoms of heat. Some show all symptoms to a marked degree, and others are difficult to detect in heat.

On the average, beef cows come in heat about 60 days after calving, but the interval varies, ranging from as little as 12 days to as much as 120 days or more. On the average, heifers come in heat for the first time at around 12 months of age. However, individual heifers vary considerably from the average, and the average age may be different for different breeds.

The age at which heifers should first be bred depends on their size, the plane of nutrition on which they have been raised, management practices on the farm or ranch, and the experience of the breeder.

Several experiments have shown that satisfactory results are obtained when heifers are bred to calve for the first time at 2 years of age, and this practice is recommended under conditions of good nutrition and where experienced personnel can give close attention to the heifers at calving time. Under other conditions it may be more profitable to delay first calving until the heifers are between 2½ and 3 years of age. Some purebred breed associations have rules prohibiting the registration of calves born to heifers under 2 years of age.

The cessation of heat periods following breeding is a fair indication that a cow is pregnant, but this is far from infallible as some nonpregnant cows fail to return to heat. On the other hand, a few cows will return to heat while pregnant, particularly in the late stages of pregnancy.

When a cow fails to return to heat at the expected time after breeding and later proves to be nonpregnant, an embryo apparently had begun to develop but died at an early age. Many such occurrences in a herd may indicate the presence of disease, particularly vibriosis.

Pregnant cows become more quiet and docile and put on weight as the gestation period progresses. They begin to show a fullness in the region of the abdomen 5 or 6 months after being bred. The average gestation period for beef cattle is approximately 283 days, or about 9½ months (table 1).

TABLE 1.—*Gestation table for cows (283 days)*

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Day of month bred	Explanation: Find date cow was bred in first column and month bred in top line. The date in column below opposite date bred will be the time at which the cow is due to calve											
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	11	11	9	9	8	11	10	11	11	11	11	10
2	12	12	10	10	9	12	11	12	12	12	12	11
3	13	13	11	11	10	13	12	13	13	13	13	12
4	14	14	12	12	11	14	13	14	14	14	14	13
5	15	15	13	13	12	15	14	15	15	15	15	14
6	16	16	14	14	13	16	15	16	16	16	16	15
7	17	17	15	15	14	17	16	17	17	17	17	16
8	18	18	16	16	15	18	17	18	18	18	18	17
9	19	19	17	17	16	19	18	19	19	19	19	18
10	20	20	18	18	17	20	19	20	20	20	20	19
11	21	21	19	19	18	21	20	21	21	21	21	20
12	22	22	20	20	19	22	21	22	22	22	22	21
13	23	23	21	21	20	23	22	23	23	23	23	22
14	24	24	22	22	21	24	23	24	24	24	24	23
15	25	25	23	23	22	25	24	25	25	25	25	24
16	26	26	24	24	23	26	25	26	26	26	26	25
17	27	27	25	25	24	27	26	27	27	27	27	26
18	28	28	26	26	25	28	27	28	28	28	28	27
19	29	29	27	27	26	29	28	29	29	29	29	28
20	30	30	28	28	27	30	29	30	30	30	30	29
21	31	Dec. 1	29	29	28	31	30	31	July 1	31	31	30
22	Nov. 1	2	30	30	Mar. 1	Apr. 1	May 1	June 1	2	Aug. 1	Sept. 1	Oct. 1
23	2	3	31	31	2	2	2	2	3	2	2	2
24	3	4	Jan. 1	Feb. 1	3	3	3	3	4	3	3	3
25	4	5	2	2	4	4	4	4	5	4	4	4
26	5	6	3	3	5	5	5	5	6	5	5	5
27	6	7	4	4	6	6	6	6	7	6	6	6
28	7	8	5	5	7	7	7	7	8	7	7	7
29	8	-----	6	6	8	8	8	8	9	8	8	8
30	9	-----	7	7	9	9	9	9	10	9	9	9
31	10	-----	8	-----	10	-----	10	10	-----	10	-----	10

## Number of Cows per Bull

Well-developed young bulls can be put in service at 12 to 14 months of age on a limited number of cows. The number of cows that a 2-year-old bull or a mature bull can serve satisfactorily depends on the method of breeding that is practiced. If the bull is kept in a pen and the cows are brought to him for service, 30 to 35 cows may be allotted to a well-grown 2-year-old bull and twice that number to a mature bull. If a bull is used in pasture breeding, the number of cows per bull depends on the size and topography of the pasture. Where the pastures are large and rough, as in some western ranges, there should be at least 1 bull for each 25 cows. In smaller and more easily accessible pastures, the number of cows per bull can be increased.

## Breeding Seasons

Although considerable numbers of calves are dropped in the summer and fall, many breeders, especially in the northern areas, prefer to breed their cows for spring calving. Calves dropped in the spring have the advantage of favorable climatic and environmental conditions. Also, spring calves obtain more milk than fall calves, provided their dams are grazing succulent pasture. Moreover, a breeder may sell his spring calves at weaning time and thus eliminate the expense of wintering them; or he may hold them over one wintering period and sell them the following spring or fall.





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FIGURE 5.—Shorthorn breeding cows on pasture.

On the other hand, many breeders, especially in certain areas in the South, consider fall calving a sound practice. Calves dropped in the fall are not subjected to hot weather, flies, and other insects; and they may be given closer attention during a critical period in their lives.

Unless a breeder plans to exhibit cattle at stock shows, he would do well to confine the breeding season to about 3 months of the year in order to have a fairly uniform calf crop with respect to size and age. If a breeder plans to exhibit in all classes at fairs, several breeding seasons will be required. In a herd with more than one breeding season it must be remembered that calves will be raised under different environmental conditions and comparisons of their performance records will be difficult or impossible.

### **Care of Cow and Calf During Parturition**

Cows on good pasture that calve late in the spring and in the summer seldom need assistance during parturition. However, it is advisable for the herdsman to be on hand at parturition, particularly with heifers and with cows whose gestation period has been unusually long. Many cows give considerably more milk than the newborn calf can consume, so it may be necessary for the herdsman to milk the cow daily until the calf is large enough to consume all of its mother's milk.

In the winter and early spring, particularly during cold and stormy weather, a cow or heifer due to calve within a few days should be comfortably housed in a stall by herself but preferably near other cattle. Generally speaking, little change should be made in her ration. Immediately after parturition, she should be given lukewarm water, and a few hours later she should be given a small quantity of oats, wheat bran, and legume hay.

If a cow has not calved within 4 or 5 hours after the onset of labor, it is advisable to examine her. A herdsman who has had considerable experience with cattle usually can render any aid that is needed. However, in some instances it may be necessary to call a veterinarian. If the calf seems lifeless or very weak at birth, the attendant should examine its nostrils and mouth and remove any mucus that may be obstructing normal breathing. Blowing air into the mouth and nostrils after removing the mucus may aid in reviving the calf. Small and weak calves should be assisted in nursing through the first day after birth. If calves are born dead and it is definitely known that the cause is not suffocation, it is desirable to have them examined thoroughly by a veterinarian.

## **DEVELOPMENT OF YOUNG STOCK**

### **Calves to Weaning Age**

Occasionally a cow or heifer will not give enough milk to nourish her calf properly, and it then becomes necessary to obtain milk from another cow. Milk production is a heritable character, and calves produced by these cows as well as the cows themselves should be culled. Nurse cows should be used only in emergencies. Breeding cows that fail to produce enough milk for their calves and that require the assistance of nurse cows to help raise their calves are not economical from a beef-production standpoint and should be culled from the herd regardless of body type.

Calves fed grain prior to weaning usually weigh more at weaning than similar calves that receive no grain. This practice increases production costs. However, if the breeder wants extra growth and finish on his calves prior to weaning, as when he is fitting the calves for show purposes, supplemental feeding of grain in creeps is recommended. Calves usually will begin to eat grain when they are 4 or 5 weeks of age.

Milk and pasture are both rich in protein, so supplemental feed for young calves running with their mothers on pasture can consist of grain only. Some cattlemen prefer to feed mixtures of two or more grains. Shelled corn, rolled barley, whole oats, or mixtures of these or other grains are satisfactory. The grain mixture can be fed in a shaded creep located near salt and water (fig. 6).

The inclusion of a high-protein supplement as 10 to 15 percent of the mixture, particularly as calves approach weaning age, may improve palatability and increase consumption. Grains and protein supplements that are available in the area for the least cost should be used.

Calves not on pasture should have access to legume or mixed hay of good quality when they are about 3 weeks of age. Grain should be fed twice a day at regular intervals, and the calves may be permitted to nurse 3 times a day until they are consuming considerable grain and hay. When the weather permits, it is advisable to turn the calves into paddocks with their dams for 2 or 3 hours after the noon nursing.

Calves not being fitted for show purposes usually are weaned at 6 to 8 months of age, depending largely on the quantity of milk they are still receiving from their dams and on the condition of the calves.

Bull calves should be separated from the heifers when they are 6 or 7 months of age.



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FIGURE 6.—Nursing calves on pasture with their dams may be fed grain in a creep. The size of the openings in the fence surrounding the creep permits only the calves to enter.

Both heifer calves and bull calves should receive vaccine for common diseases prior to weaning, as recommended by local authorities. Brucellosis (Bang's disease) control measures recommended by State and Federal authorities should be followed.

### Young Bulls

As indicated earlier (p. 2), record-of-performance information should be given full consideration in the selection of bull calves to be developed for use as herd sires.

Most breeders put their calves on full feed after they are weaned. These breeders can obtain record-of-performance information at low cost on bulls considered good enough to be retained in the herd. To assess genetic growth at the earliest possible age, the calves should be placed on *full* feed at weaning. Test periods of not less than 5 or 6 months are recommended.

Standard rations consisting of feeds common to the area should be fed. The feeds may vary in different sections of the country, but the ration should contain (1) a cereal grain, (2) a protein supplement, and (3) a good-quality roughage.

The cereal grain may be corn, wheat, barley, oats, rye, grain sorghums, rice, or any combination of these. Byproducts, such as dried citrus pulp or dried beet pulp, may be substituted for one-third to one-half of the grain. The protein supplement may be cottonseed meal, linseed meal, or soybean meal. The roughage may be any good-quality hay or silage available at the feed lots. In areas where mineral deficiencies are known to exist, suitable mineral supplements should be provided. Salt should be available at all times.



From one-third to two-thirds of the ration should consist of concentrates. Most breeders find a convenient way to feed is to grind the roughage coarsely, mix it with the grain and protein supplement, and self-feed the mixture. One advantage of self-feeding test animals is that it virtually eliminates the human element.

Animals may be fed either individually or in groups. Individual feeding requires more labor than group feeding; also, unless a self-feeding system is used, individual feeding requires more skill in feeding to be sure that each animal has an equal opportunity to gain. However, feed-consumption records can be used to determine, in terms of feed required per hundred pounds of gain, the efficiency of feed utilization (efficiency of gain) for each animal. Thus, individual feeding leads to greater precision in the selection of breeding stock. Cattle use feed less efficiently as they grow heavier. Therefore, animals that are heaviest at the beginning of a feeding trial will have an apparent disadvantage in efficiency of gain. Adjustment must be made to allow for this if efficiency data are to be of use.

Group feeding has the advantage of providing an environment similar to the environment in which cattle are fed commercially. As rate of gain is closely related to efficiency of gain, the rate of gain for each animal during a feeding period is a good indication of its relative efficiency in using feed. In other words, the fast-gaining animal is likely to be the efficient animal. Also, unlike efficiency of gain, rate of gain seems to be nearly independent of initial weight in animals fed for 5 or 6 months immediately after weaning. Therefore, rate of gain can be used without adjustment to estimate efficiency of gain.

Research data indicate that from 70 to 80 percent as much information on efficiency of gain is obtained from data on rate of gain as with actual data on efficiency of gain.

Animals are sometimes grouped by sire for group feeding, and efficiency of gain for the group is used to evaluate the sire. This may be feasible under very carefully controlled conditions. However, undetected differences may exist between lots or pens; these differences may affect either the rate of gain or the efficiency of gain by the animals; and these, in turn, may then be mistaken for genetic differences.

Furthermore, different initial weights for calves both within and between lots may make the interpretation of efficiency data difficult or impossible. Under most conditions, it probably will be preferable to feed the progeny of all sires in one group. If the group is too large, it would be better to divide the group into lots at random rather than by sires. Rate of gain would then be used as an indicator of efficiency of feed utilization.

### Heifers

Heifer calves may also be performance-tested to obtain valuable information in the identification of high-gaining lines of cattle. The breeder need not carry out a heavy grain-feeding program if he takes a longer time to test his stock and arrive at a decision as to which heifers he will keep for replacement. Most heifers will make satisfactory growth and development when they are provided with good pasture from weaning until the arrival of cold weather and then are fed during the winter on a limited grain ration with as much good quality hay or silage as they will consume. If they are fed nonlegume



roughage, about 1 pound of a high-protein concentrate should be fed per head daily. Where heifers are to be bred to calve at 24 to 30 months of age, a higher level of feeding during the winter period would be desirable in order to produce additional growth. Heifers that calve as 2-year-olds tend to have less trouble during parturition if they are well developed physically.

Heifers to be bred to calve at 3 years of age may be wintered on roughage alone. However, for more rapid growth, during the second winter they may be fed a light grain ration in addition to hay.

Care should be taken to assure good development of replacement heifers.

Heifers not needed for herd replacements that are considered inferior for sales purposes may be fattened for slaughter when feeds are available and the price of slaughter cattle warrants it. Otherwise, they should be sold for slaughter with a minimum of feed and management expense.

Good pasture is of great importance in the development of both bulls and replacement heifers.

### CARE OF BREEDING COWS

Relatively little labor is required to care for the cows after they are turned on pasture in the spring, except to observe the herd daily to note cows in heat or due to calve, and to be sure the herd is receiving enough pasturage and enough water, salt, and minerals.

Usually salt is the only form of mineral supplement needed by beef cattle grazing highly improved pastures (fig. 7). Pastures in certain areas frequently are deficient in phosphorus, particularly during the



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FIGURE 7.—Aberdeen Angus breeding herd on summer pasture. Note that the grass has not been allowed to get beyond a good grazing stage of growth. Well-distributed shade trees enhance the value of a pasture.

dormant or winter season. Phosphorus may be supplied in the form of steamed bonemeal or cottonseed cake. Many breeders keep a mixture composed of equal parts, by weight, of common salt and bonemeal before their cattle at all times.

As far as possible, the females should be divided into age groups—the cows in one group and the heifers in another. This is necessary if the yearling heifers are to be fed grain on pasture.

The cows should be left on pasture late in the summer or in the fall until inclement weather sets in, unless their calves are to be given extra attention. If pastures are sparse, it is advisable to feed some sort of supplement, such as legume or mixed hay in racks or small quantities of concentrates.

The amount of shelter and supplemental feed needed by dry brood cows during the winter varies greatly with location.

In the humid areas of the Middle Western and Northeastern States, it usually is advisable to provide some shelter. An open shed (fig. 8), with the open side opposite the direction of prevailing winds and storms, makes a satisfactory shelter. Allowing cows freedom to go in and out at will is usually preferable to shutting them up in barns.

Suitable sheds and other equipment for beef cattle are illustrated and discussed in detail in Farmers' Bulletin 1584, "Feed-lot and Ranch Equipment for Beef Cattle," which is available from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., at 10 cents a copy.

In western range areas and in the South, brood cows usually run out all winter. Wooded areas, willow bottoms, ravines, etc., provide all the shelter needed.



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FIGURE 8.—Open shed with feed bunks built along the inside wall. This arrangement provides shelter for the cows in the winter and saves both feed and bedding.

In many areas, brood cows can get their roughage during the winter from crop residues such as cornstalks, or from dry pasture or range forage. In such areas only protein and minerals will be needed as supplements.

In areas where brood cows must be fed entirely on harvested feeds during the winter, it often is desirable to feed out on pasture—seeking a new feed ground each day—so that the manure will be deposited where needed.

The following rations are suggested as a guide for wintering breeding cows in areas where they must be fed entirely on harvested feeds:

Ration No. 1:	<i>Ration, and kind of feed</i>	<i>Pounds</i>
	Corn, grass, or sorghum silage.....	35
	Legume hay.....	6
Ration No. 2:		
	Corn fodder.....	15
	Mixed hay.....	10
	Straw (oat).....	5
Ration No. 3:		
	Soybean or sorghum silage.....	50
	Straw or cottonseed hulls.....	5
	Cottonseed meal.....	1
Ration No. 4:		
	Corn or grass silage.....	35
	Mixed hay.....	10
	Cottonseed meal.....	1
Ration No. 5:		
	Corn silage.....	25
	Soybean hay.....	7
	Wheat straw.....	3
Ration No. 6:		
	Clover or alfalfa hay.....	10
	Wheat straw.....	15
	Cottonseed cake.....	1
Ration No. 7:		
	Prairie or other grass hay.....	16 to 25
	Cottonseed meal.....	1

If desired, an equal amount of linseed meal, soybean meal, or a similar concentrate containing 41 percent of protein may be substituted for the cottonseed meal in the above rations.

It may be desirable to feed thin-fleshed cows about 3 or 4 pounds of grain per animal per day during the winter, but ordinarily there is no need to feed grain to mature pregnant cows in thrifty condition.

Cows nursing calves through the winter will need supplemental feed to keep them thrifty and to stimulate the flow of milk. They will need per head daily about 35 pounds of corn, grass, or sorghum silage; 10 pounds of legume or mixed hay of good quality; and about 5 pounds of a grain mixture, such as 3 parts, by weight, of corn-and-cob meal and 1 part each of wheat bran and cottonseed meal. However, the amount of feed required naturally varies with the size and condition of the animals. The silage and grain may be fed in the barn and the hay in racks or bunks outdoors.

## CARE OF THE HERD BULL

The method of managing the herd bull depends largely on the breeding program. As previously stated, some breeders permit the bull to run with the cows during the breeding season; others keep the bull separate from the herd and bring the cows to him for service.



It is common practice to winter the herd bull in a shed or feed lot and to feed him liberally on grain, protein concentrates, and roughage, with the addition of some source of vitamin A if the roughage is of poor quality. It is essential to have the bull in a thrifty condition at the beginning of the breeding season, but he should not be fat. A bull fed liberally during the winter may become too fat unless he gets considerable exercise.

Winter pasture with shelter is desirable for a bull if the pasture is conveniently located so that he may be given supplemental feed each day. Grain at the rate of  $\frac{1}{2}$  to 1 pound per 100 pounds of liveweight should be sufficient for a bull on good pasture, if he is in thrifty condition when winter begins. If pasture is not available, he should be fed a good-quality legume hay at the rate of approximately  $1\frac{1}{2}$  to 2 pounds per 100 pounds of liveweight, or  $\frac{3}{4}$  to 1 pound of hay with about 1 pound of silage per 100 pounds of liveweight.

### EXERCISE

Exercise is considered desirable for the proper physical development of all classes of beef cattle.

Normally, cows get sufficient exercise. During the summer they are on pasture. Where winter pasture is not available, exercise lots or areas with open sheds or natural shelter should be provided.

Calves that are allowed to run with their dams will get sufficient exercise. Calves that are kept in barns and not allowed to run with their dams should have access to paddocks.

If the bull is not running with the cow herd, he should have access to a paddock or small pasture. During the winter he usually will get sufficient exercise if he is placed with pregnant cows or if he is permitted to run with the open cows for a few hours each day.

### GENERAL SUGGESTIONS

When cattle are registered with their respective breed associations, some form of identification is necessary to establish accurate records. Some registry associations require tattoo identification on the inside of the ears. This is one of the most permanent means of identification. However, tattoo marks are somewhat difficult to read on breeds with pigmented skins, such as the Aberdeen Angus. Neck chains with numbers are generally used for polled breeds. Eartags are used by many breeders, but they are not a fully dependable means of identification as tags are sometimes torn out. Hot-iron hip brands may be used, and these combined with ear tattoos are more satisfactory than neck chains or eartags alone. All cattle in the herd should have some form of identification, and this should be recorded carefully.

The herdsman should have two breeding books—a pocket-size book for his daily use and a larger office book for a permanent record of all breeding and calving dates. It is also a good plan to make notes of irregularities in breeding and calving, unduly short or long gestation periods, physical abnormalities, and color markings of calves dropped.

Production cost per animal usually is higher in breeding herds kept for the production of registered cattle than in herds kept strictly for the production of feeder or fat-cattle. The former requires a bigger

initial investment per head, more labor, and more expensive equipment. Adequate equipment, such as barns and sheds, is necessary but it need not be elaborate. Sheds will suffice for almost all classes of beef cattle, with the possible exception of cows at calving time during inclement weather. Farmers' Bulletin 1584, "Feed-Lot and Ranch Equipment for Beef Cattle," contains detailed information on equipment needed in the production of beef cattle.

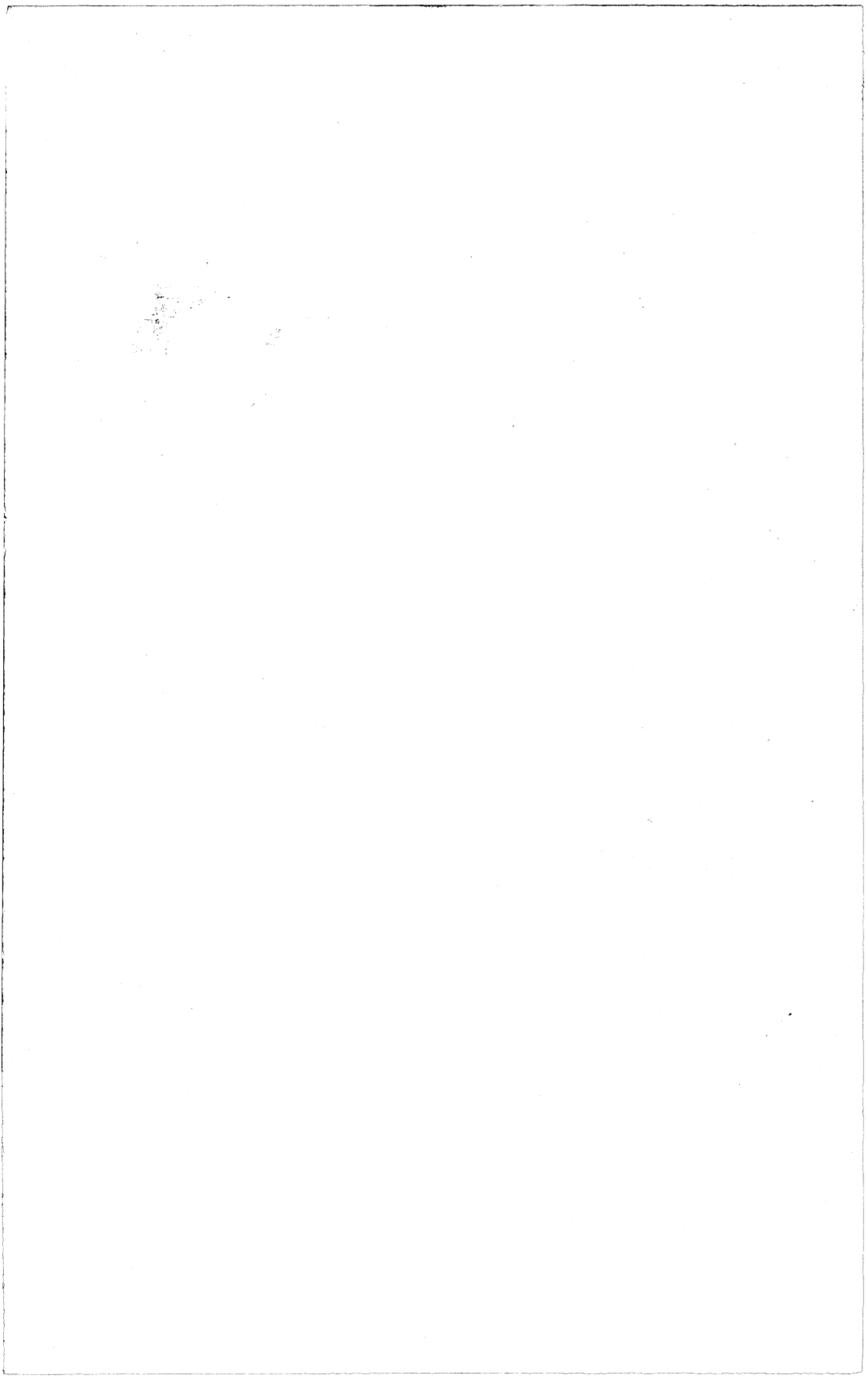
In areas where considerable quantities of silage can be produced, it is advisable to have one or more silos, depending on the number of cattle being fed and the capacity of the silo. A discussion of silos and their construction is contained in Farmers' Bulletin 1820, "Silo Types and Construction."

To exhibit animals to best advantage to prospective buyers, the breeder of registered cattle should keep the herd in a somewhat fatter condition and should develop the young stock to a greater degree than would be necessary in a commercial herd. This will require a larger financial outlay for feed and labor.

Percentage of calf crop, number of calves raised, and death losses have a more direct bearing on production costs than almost any other combination of factors. Therefore, a cattle breeder should cull non-breeders, maintain his cattle at the proper nutritional level, and have enough proved bulls to serve the herd adequately in order to obtain a high percentage calf crop.

The breeder should select herd replacements on the basis of type and performance, with special emphasis on size, weight-for-age, disposition, and milk production of dams.

The breeder should maintain his herd under sanitary conditions. He should have his herd tested periodically for tuberculosis, brucellosis (Bang's disease), and other diseases in accordance with State and Federal regulations. In many areas it is necessary to vaccinate young stock against such diseases as blackleg. Introducing diseases into the herd through failure to observe proper precautions when additions to the herd are made and failure to keep the herd in a healthy condition through proper nutrition and sanitary conditions will lead to serious difficulties. Attention to such matters often determines whether the enterprise is a success or failure.



# PREVENT FARM FIRES



Fires kill more than 3,000 farm people each year, and cause painful injury to many thousands more.

In farm homes fire is the main cause of death and injury among younger people.

Each year fires destroy \$133,000,000 worth of farm property.

Much of this loss and suffering can be avoided by taking precautions to prevent fires or by being prepared to control those that do get started. In making a fire-safety check on your own farm, keep in mind that the primary causes of farm fires are—

- ▶ Lightning
- ▶ Sparks on the roof
- ▶ Defective chimneys or heating systems
- ▶ Faulty electric wiring or appliances
- ▶ Careless smokers
- ▶ Careless use or storage of gasoline, kerosene, oily rags, and such
- ▶ Children playing with matches

Don't start any fire unless you know you can stop it.

Keep a fire extinguisher handy and make sure every member of the family knows how to use it.

*For details, see U. S. Department of Agriculture Farmers' Bulletin No. 1643, Fire Safeguards for the Farm.*